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Ford Motor Company
AERONUTRONIC DIVISION

RELIABILITY SUMMARY REPORT FOR MAY 1963

Penetration Aids Development

Contract AF 04(694)-23

Dated 15 September 1961

Approved by: _____

G. A Lasky, Program Manager
Penetration Aids
Re-entry Systems Programs

AERONUTRONIC DIVISION

FORD MOTOR COMPANY

Newport Beach, California

Ford Motor Company

AERONUTRONIC DIVISION

COMPONENT FAILURE SUMMARY
RS-2

Month Ending May 31, 1963

COMPONENT NAME	AERONUTRONIC PART NUMBER	OPERATION DURING:		CURRENT MONTH					LAST SIX MONTHS				
				OPERATING CYCLES	NUMBER OF FAILURES				OPERATING CYCLES	NUMBER OF FAILURES			
					CRITICAL	MAJOR	MINOR	TOTAL		CRITICAL	MAJOR	MINOR	TOTAL
SEQUENTIAL TIMER ACCELERATION SENSOR	201203 and 202656	DEVELOPMENT TEST	ENV.										
			AMB.						15	1			1
		CERTIFICATION AND ACCEPTANCE	ENV.						28				
			AMB.	290			1	1	427			2	2
		FIELD OPERATION	CHECKOUT										
			FLIGHT						5				
SEQUENTIAL TIMER PULSE SEQUENCER	201203 and 202656	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.						14	1			1
			AMB.	335	1			1	744	1	3		4
		FIELD OPERATION	CHECKOUT						12				
			FLIGHT						5				
ORIENTATION MECHANISM - RE-ENTRY	200595 and 201700	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.										
			AMB.	8					980				
		FIELD OPERATION	CHECKOUT						38				
			FLIGHT						13				
ORIENTATION MECHANISM - VACUUM	201644 and 202580 and 203400	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.						16				
			AMB.	12					1541		6		6
		FIELD OPERATION	CHECKOUT										
			FLIGHT										
SEQUENCE DISTRIBUTION BOX	202461 and 202543 and 203512	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.										
			AMB.	3					137		3	2	5
		FIELD OPERATION	CHECKOUT						12				
			FLIGHT						4				
POWER SUPPLY	201201 and 202837	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.										
			AMB.						4			1	1
		FIELD OPERATION	CHECKOUT										
			FLIGHT						5				
FAIRING EJECTION MECHANISM	201411 and 203024 and 204043	DEVELOPMENT TEST	ENV.										
			AMB.						10				
		CERTIFICATION AND ACCEPTANCE	ENV.						32	1	3		4
			AMB.	3					7				
		FIELD OPERATION	CHECKOUT										
			FLIGHT						4				
RE-ENTRY VARIJECTOR	203181 et al.	DEVELOPMENT TEST	ENV.	19					28		1		1
			AMB.	6					12				
		CERTIFICATION AND ACCEPTANCE	ENV.	30		2		2	50		8	1	9
			AMB.										
		FIELD OPERATION	CHECKOUT										
			FLIGHT										
VACUUM VARIJECTOR	203090 203252 et al.	DEVELOPMENT TEST	ENV.	31					54				
			AMB.	30					67				
		CERTIFICATION AND ACCEPTANCE	ENV.	28					116		4		4
			AMB.						18				
		FIELD OPERATION	CHECKOUT										
			FLIGHT						15				
RE-ENTRY SPRING EJECTOR	202397	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.										
			AMB.						21		4		4
		FIELD OPERATION	CHECKOUT										
			FLIGHT										
VACUUM SPRING EJECTOR	203244	DEVELOPMENT TEST	ENV.										
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.										
			AMB.										
		FIELD OPERATION	CHECKOUT										
			FLIGHT						1				
VACUUM DECOY	203451 203449 et alp	DEVELOPMENT TEST	ENV.						30		8		8
			AMB.										
		CERTIFICATION AND ACCEPTANCE	ENV.	2		1		1	12		7		7
			AMB.										
		FIELD OPERATION	CHECKOUT										
			FLIGHT						16				

Ford Motor Company
AERONUTRONIC DIVISION

RELIABILITY PROBLEM STATUS
RS-3

MAY 1963

PROBLEM NUMBER	COMPONENT NAME AND PART NUMBER	DESCRIPTION OF PROBLEM	CAUSE OF FAILURE	FAILURE FROM THIS PROBLEM		CORRECTIVE ACTION	EFFECTIVITY	FIX PROVEN PROBLEM CLOSED
				THIS MONTH	LAST SIX MONTHS			
C-105	Sequential Timer 202656	The sequencer motor failed to start when "recycle" voltage was applied.	Preliminary investigation indicated the motor-governor unit was at fault. Further investigation will be carried out by Aeronutronic and the supplier.	1	1	Pending the results of the investigation.		
C-79	Gas Generator Squib (Power Supply) 203004	The unit failed to ignite during acceptance testing.	Absorption of water by the igniter pellet occurred during humidity test. Leakage probably was the result of mishandling.	0	1	The sublot from which the failed unit was selected will not be used in higher assemblies.	May 22, 1963	May 31, 1963
M-106	Sequence Distribution Box 203512 (Relays 203480, 203482, 203717)	Relays indicated high contact resistance.	Supplier manufacturing and test methods and procedures were inadequate.	12	12	Procurement documents (drawings, specifications, etc.) have been upgraded to incorporate provisions for better manufacturing controls and more thorough testing.	May 3, 1963	May 3, 1963
M-100	Fairing Ejector 204043	Ejection velocity was below lower specification limit during acceptance testing; also, the reaction load was above the upper specification limit.	The new design has slightly different characteristics with respect to velocity and reaction load.	0	3	Aeronutronic has proposed that the specification be changed to reflect actual system requirements, which include the demonstrated performance characteristics of the new unit.		
M-101	Shaped Charge Assy. 203030	The shaped charge did not completely cut the strap. The assy. had been exposed to high and low temperature, salt fog, and random vibration.	Handling of the shaped charge ribbon during and prior to installation causes flattening which in turn results in inadequate performance during burning.	0	2	A special form block has been made to pre-form the ribbon prior to installation, thus reducing the chances of damage during installation.	April 29, 1963	May 31, 1963

Ford Motor Company
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RELIABILITY PROBLEM STATUS
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MAY 1963

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				THIS MONTH	LAST SIX MONTHS			
M-94	MK 3/4 Re-entry Varijector (Low Range) 203380	Total corrected impulse was below the lower limit of acceptability during firings at both low (2) and ambient (1) temperature.	The specification requirements were unclear and the methods and procedures for obtaining impulse were not well defined.	0	3	The applicable specifications have been updated to reflect the results of a "statistical test program", the purpose of which was to clearly define the range of acceptable impulse values.	Production Units	May 31, 1963
M-108	MK 3/4 Re-entry Varijector (Ejector) 203799	Incomplete burning of the propellent occurred during functional test. Units had been exposed to qualification test environments.	The teflon nozzle seals allowed water to enter the motor case during exposure to humidity.	2	2	Improved process methods and controls have been incorporated for the teflon seal process. Requalification tests are in progress to evaluate the effectiveness of this fix.		
M-95	MK 3/4 Vacuum Varijector (Low Range) 203798	Total corrected impulse was below the lower limit of acceptability during firings at low temperature.	Same as Problem No. M-94.	0	2	Same as Problem No. M-94.	Production Units	May 31, 1963
M-102	Vacuum Varijector	The teflon coating separated from the pawl pads during exposure to temperature and humidity cycling.	The bonding and curing procedures were not adequately controlled by manufacturing process specifications.	0	6	Aeronutronic has revised the manufacturing process specification which controls this process.	Production Units	May 27, 1963
M-83	MK 6 Varijector 202252	Units failed to pass the "Radiflo" leak test after being subjected to qualification test environments.	Probable cause: Corrosion of the "O" ring seal areas on the motor case by the combined action of N_2O_4 and salt spray environments, respectively.	0	14	Performance tests of leaky units indicated no degradation, therefore this problem reverts to "minor" for RS purposes.	May 31, 1963	May 31, 1963

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RELIABILITY PROBLEM STATUS
RS-3

MAY 1963

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				THIS MONTH	LAST SIX MONTHS			
M-76	MK 6 Re-entry Decoy Model 1033P	The nose canister would not eject from decoy.	Development test and friction/stress analysis indicate that the canister sticking problem is caused by the marginally locking taper characteristic of the decoy profile.	5	35	Undelivered units will be reworked by bonding a solid teflon sheet on the conical interior of the nose canister to reduce friction. --- Aeronutronic is investigating redesign of the nose canister.	SN 334 and Subs.	
M-88	MK 6 Re-entry Decoy Model 1033P	Nose canister bonded joints separated during vibration test. Unit had been through all other qualification environments.	Degradation of support bond strength during exposure to N_2O_4 and vibration. The design appears to be marginal with respect to the present vibration requirement.	0	3	Aeronutronic is negotiating to reduce vibration requirements. Redesign of the nose canister is under investigation. (See M-76, above.)		
M-71	MK 6 Midcourse Decoy 203449 and MK 4 Vacuum Decoy 203451-501	Decoy did not deploy after exposure to humidity and/or/plus propellent oxidizer (N_2O_4). Separation of the aluminum coating occurred.	The decoy folds stuck together, and when piston released alcohol the decoy ruptured locally. High temperature-humidity cycling caused the aluminum to separate from the mylar and also caused stickiness of the seams.	0	15	Tests indicate that a new teflon wrap and aluminum chromate will protect the MK 6 decoy. --- The humidity requirement has been waived by the customer.	1 and Subs. on MK 4 Units	
M-97	MK 6 Midcourse Decoy 203449	The aluminum end hub (varijector end) separated from the canister during vibration testing.	Bond strength is very sensitive to process variations. Improvements are under investigation.	0	1	Pending the results of the investigation. Action has been initiated to incorporate proof testing for bond strength. Supplementary riveting is presently being tested.		

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MAY 1963

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				THIS MONTH	LAST SIX MONTHS			
M-107	MK 4 Vacuum Decoy 203451-501 and MK 6 Midcourse Decoy 203449	Decoy canister halves would not separate both during a functional test at 400 RPM and during manual disassembly.	Temperature induced tackiness of the decoy teflon wrap and the internal canister surfaces.	5	5	Development testing is underway to provide compatibility data on teflon wrap material and the canister surface. Aeronutronic is investigating canister separation forces to compare the forces available with the expected total restraining forces.		

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